Taxonomic Notes on *Menophra atrilineata* (BUTLER) (Lepidoptera, Geometridae)

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It is well known that *Menophra atrilineata* (BUTLER) is an important pest of the mulberry, *Morus* spp., in Japan and Taiwan. This species is also distributed in Korea, China, Southeast Siberia and Southeast India. Founded on the bipectinate antenna in female WARREN (1894) established the genus *Phthonandria* for the reception of this species. WEHRLI (1941) added *P. emarioides* and its variety *epistygna* from China, and he suggested that *Hemerophila cuneilinearia* WILEMAN from Taiwan might be closely related to *emarioides*.

Recently I had an opportunity to rear some larvae of *atrilineata* in Taiwan, and found that all the adults emerged from them should be identified with *cuneilinearia*. Moreover I was able to examine the type-specimens of *emarioides* and *epistygna* through the courtesy of Dr. D. STÜNING, Museum Alexander Koenig, Bonn.

In this paper I give a taxonomic account of *Menophra atrilineata* (BUTLER), with notes on the genera *Phthonandria* and *Menophra*.

Menophra atrilineata atrilineata (BUTLER)

(Figs. 1–4)

Hemerophila atrilineata BUTLER, 1881: 405; PROUT, 1915: 363, pl. 20: c; INOUE, 1957: 276, pl. 59: 1462; INOUE, 1959: 219, pl. 156: 9.
Phthonandria atrilineata: WARREN, 1894: 434; WEHRLI, 1941: 460; INOUE, 1956: 345; INOUE, 1977: 309.
Menophra atrilineata: INOUE, 1982: 560, pl. 102: 18–20.
Hemerophila brunnearia HERZ, 1905: 367, pl. 1: 5.
Phthonandria emarioides WEHRLI, 1941: 460, pl. 40: g. **Syn. nov.**
Phthonandria emarioides var. *epistygna* WEHRLI, 1941: 460, pl. 40: g. **Syn. nov.**

Phthonandria emarioides (Figs. 1–2) was described from 3♂, 6♀ taken at Shanghai, Mokanshan and Lung-tan near Nanking and *P. e.* var. *epistygna* (Figs. 3–4) from 2♂, 4♀ taken at Shanghai and Tai-shan in China. Examination of their genitalia (Figs. 8–9) has shown that they are conspecific with *atrilineata*. WEHRLI (1941) mentioned that *emarioides* is distinguished from *atrilineata* by male genitalia. My examination of two slides of the male genitalia (nos. 7306 & 7307) of *emarioides* made by WEHRLI revealed that there are no differences between *emarioides* and *atrilineata*. Chinese *atrilineata* figured by YANG (1978) and ZHU (1981) are more similar in appearance to *epistygna* than to *emarioides*. Subspecific treatment of Chinese population will be left for a future study.

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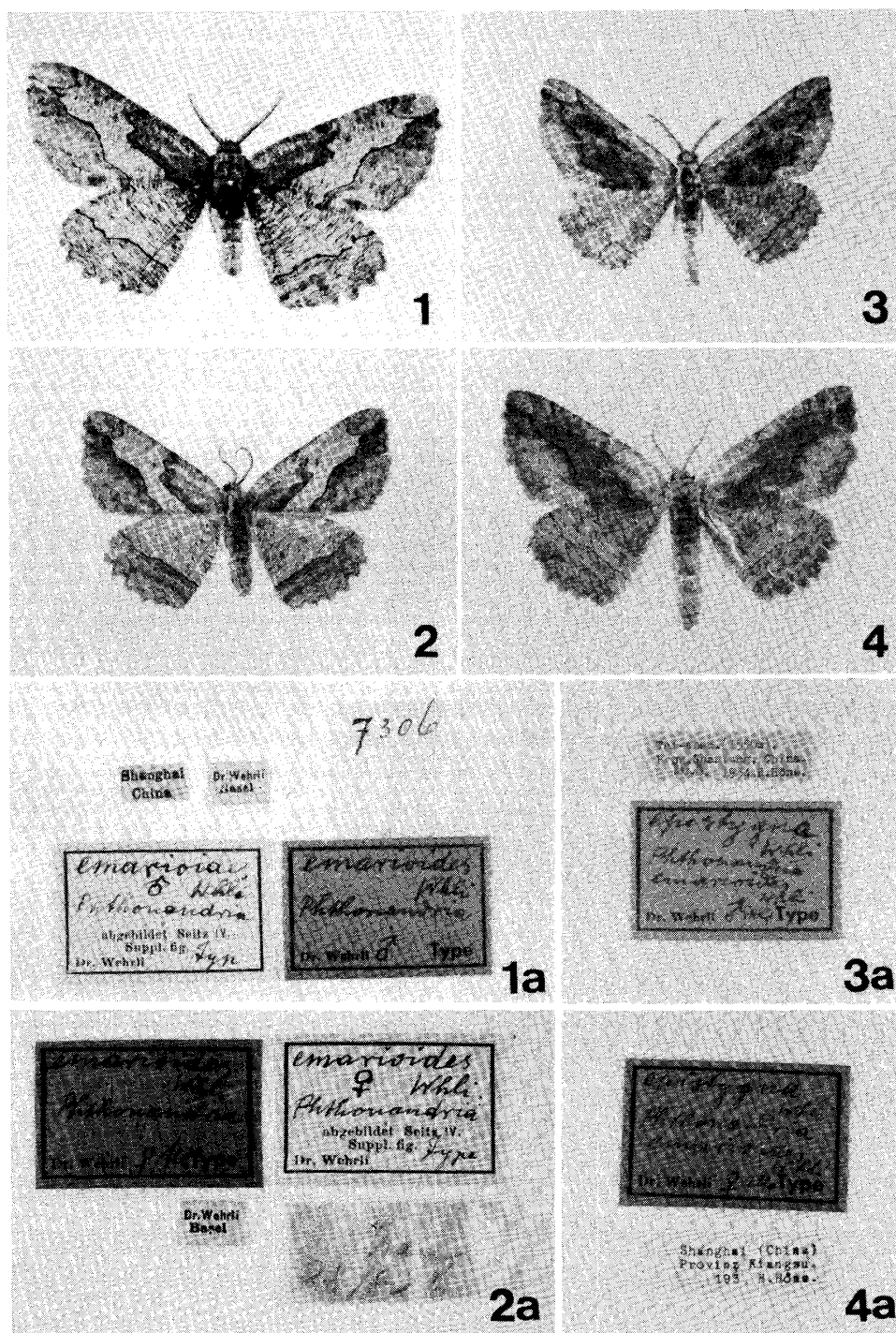
Figs. 1–2. *Phthonandria emarioides* WEHRLI. 1: Lectotype, ♂. 2: Paralectotype, ♀. Figs. 3–4. *P. emarioides* var. *epistygna* WEHRLI. 3: Lectotype, ♂. 4: Paralectotype, ♀. a: Labels.

surface darker, with lines inconspicuous; in forewing medial dark part more developed.

Material examined: Taiwan. Nantou: 3♀, Lushan, 13–15. viii. 1983 (R. SATO); 1♂1♀, Hotso, 26–29. vi. 1973 (M. OWADA); Puli, 1♂, summer 1963 (native collector). Chiai: Fenchifu, 1♀, 1. iii. 1982 (S. HASHIMOTO). Pintung: Kenting Park, 1♀, 14. iii. 1982 (S. HASHIMOTO).

Distribution: Taiwan.

In the original description of *cuneilinearia*, WILEMAN (1911) did not mention that the female antenna is bipectinate, and he considered it allied to *Hemerophila subplagiata*
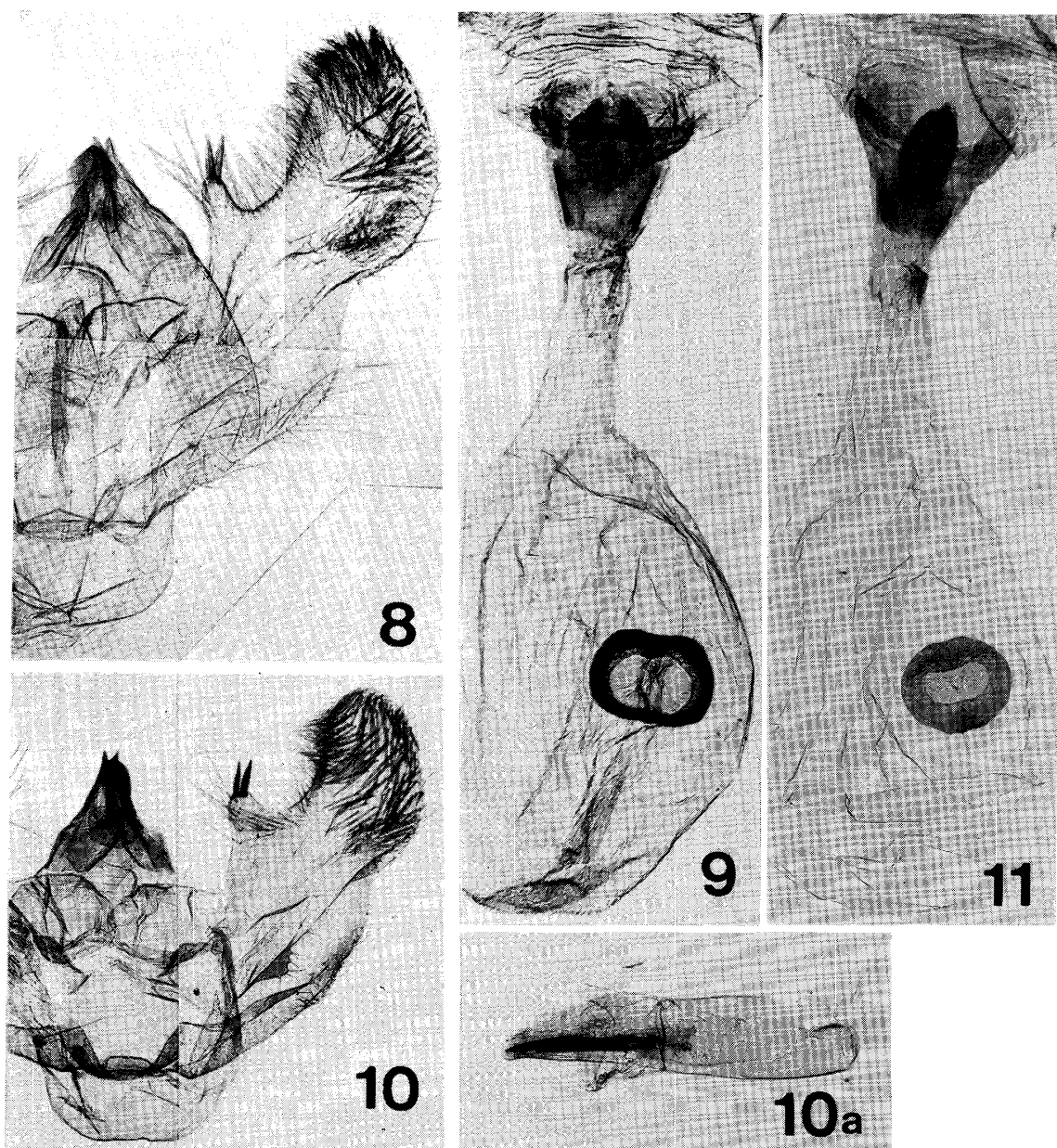
Fig. 8. Male genitalia of *Phthonandria emarioides* WEHRLI. Lectotype. Slide no. 7306; Prepared by E. WEHRLI. Fig. 9. Female genitalia of *P. emarioides*. Paralectotype. Figs. 10–11. Genitalia of *Menophra atrilineata cuneilinearia* (WILEMAN). 10: Male. Slide no. RS–1622. 10a: Ditto, aedeagus. 11: Female. Slide no. RS–1623.

WALKER. PROUT (1914) pointed out that *cuneilinearia* is quite nearly related to *atrilineata* on the basis of the characteristics of female antenna. My close examination of male and female genitalia and external characters of mature larva (Fig. 7) has led to me to the conclusion that *cuneilinearia* is conspecific with *atrilineata*. In superficial appearance the Taiwanese population differs subspecifically from the Japanese and Korean ones.

M. atrilineata has been well known in the field of applied entomology as the mulberry looper in Taiwan as well as in Japan for a long time. SHIRAKI (1913) and MAKI (1915) described external characters of adult, larva and pupa of the Taiwanese population under the name of *Boarmia* (*Hemerophila*) *atrilineata* BUTLER, but they did not observe the distinction between the Japanese and Taiwanese populations.

Notes: I (SATO, 1977) described the mature larvae of *Phthonandria atrilineata* and its allies, *Menophra emaria* (BUTLER), *M. harutai* (INOUE) and *Ceruncina retractaria senilis* (BUTLER), and divided into two distinct groups, i.e., "A" (*atrilineata* and *emaria*) and "B" (*harutai* and *retractaria senilis*). Later I (SATO, 1980) reported that the genus *Ceruncina* is synonymized with *Menophra*, and that *senilis* is a good species. Recently INOUE (1982) transferred *atrilineata* from *Phthonandria* to *Menophra*. My further study revealed that there are also the following differences between A and B groups.

First instar larva. Group A: Head pale brown; dorsal and ventral areas black, strongly contrasted with white lateral area. Group B: Head and body equally pigmented with yellowish orange.

Female antenna. Group A: Bipectinate in *atrilineata*, and very shortly bipectinate in *emaria*. Group B: Simple.

These characters are of generic significance, and so the two groups may be separated generically, that is, *atrilineata* and *emaria* belong to *Phthonandria* and *harutai* and *senilis* to *Menophra*. I am placing *atrilineata* in the genus *Menophra* according to INOUE (1982), however, until more careful study of many Palaearctic and Indo-Malayan species can be made.

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摘　　要

クワエダシャクに関する分類学的知見（佐藤力夫）

Menophra atrilineata (BUTLER) クワエダシャクは，桑の害虫としてよく知られている．WARREN (1894) は，雌触角が両櫛歯状であることに着目してこの種を模式種として，属 *Phthonandria* を創設した．WEHRLI (1941) は，中国から *emarioides* とその変種 *epistygna* を *Phthonandria* として記載し，さらに台湾の *cuneilinearia* も同属と考えた．本報ではこれらの種を再検討し，*emarioides, epistygna, cuneilinearia* はいずれもクワエダシャクそのものであることが判明したので，*atrilineata* のシノニムとして整理した．ただし台湾の個体群は，翅表全体に黄色味が強く，横線ははっきりせず，前翅の中央黒色部がよく発達するなど，日本・朝鮮産と明らかに異なるため亜種として扱うことにした．なお本種とその近縁種については，属レベルの再検討が必要であるが，現段階では井上 (1982) に従って本種を *Menophra* 属の一員としておく．

Menophra atrilineata atrilineata (BUTLER, 1881)

Phthonandria emarioides WEHRLI, 1941. **Syn. nov.**

Phthonandria emarioides var. *epistygna* WEHRLI, 1941. **Syn. nov.**

分布．日本，朝鮮，シベリア南東部，中国，インド南東部．

Menophra atrilineata cuneilinearia (WILEMAN, 1911) **comb. & stat. nov.**

分布．台湾．

台湾では戦前，応用昆虫学の分野で，日本と共通のクワエダシャクが分布するものとして，*atrilineata* の名で生態や防除について研究が進められた．素木（1913）と牧（1915）の報告はともに各ステージを詳しく記載したものであるが，成虫の体色斑紋が日本のものと異なるという記述は見られない．「経過習性」の項では，「1年5回以上」（素木），年発生回数は明確ではないが，「4，5回に達するならん，2，3月頃に最も多く」（牧）と記されており，日本と異なる周年経過が報告されている．WILEMAN（1911）が *cuneilinearia* を記載した当時，その実体を知るすべもなかったわけで，結局現在に至るまで台湾の「クワエダシャク」は，応用昆虫学の分野では日本と共通の *atrilineata* として扱われ，分類学の分野では，*cuneilinearia* として認識されてきたことになる．

私（佐藤，1977）は，日本のクワエダシャクとその近縁種の終齢幼虫を調査し，A, B 2つのグループに分けられることを報告した．A は本種と *M. emaria* エゾウスクモエダシャク，B は *M. harutai* ハルタウスクモエダシャクと *Ceruncina retractaria senilis* ウスクモエダシャクである．ウスクモエダシャクはその後 *Menophra* に移され，*senilis* は独立種と判った（佐藤，1980）．本報では，さらに1齢幼虫の体色斑紋パターンと雌触角の形状においても，A, B が明らかに異なることを示した．今後多くの材料を得て属の再検討を進めたい．